

INTERSTATE COMMERCE COMMISSION

REPORT OF THE CHIEF OF THE BUREAU OF SAFETY COVERING INVESTIGATION OF AN ACCIDENT WHICH OCCURRED ON THE WEST JERSEY & SEASHORE RAILROAD NEAR ELWOOD, N J, AUGUST 24, 1919

SEPTEMBER 2, 1919

To the Commission

On August 24, at about 4 43 a m there was a rear-end collision between two passenger trains on the West Jersey & Seashore Railroad near Elwood, N J, resulting in the death of one passenger and the injury of 25 passengers and one employee

The investigation of this accident was conducted jointly with the Board of Public Utility Commissioners of New Jersey, and as a result of this investigation I respectfully submit the following report

This accident occurred on the main line between Philadelphia and Atlantic City This is a double-track steam railroad line over which trains are operated by time-table, train orders, and an automatic block-signal system The accident occurred on a tangent about 25 miles in length, the point of accident being about 9 miles from the north end of the tangent The grade in this vicinity is undulating and is not heavy at any point, approaching from Magnolia, which is a little more than a mile from the point of accident, the grade is descending approximately half the distance to signal 357, then there is a short level stretch, followed by an ascending grade to the point of accident The maximum gradient on each side of the sag between Magnolia and the point of accident is 0.5 per cent and the gradient at the point of accident is 0.47 per cent The track is rock-ballasted and well maintained

The signals near the scene of the accident are of the upper quadrant three-position semaphore type, signal 349 at Magnolia being located 4,440 feet north of signal 357 which is located 2,254 feet north of the point of accident and 4,560 feet north of the signal at Elwood station At the time of the accident the weather was foggy The unobstructed view approaching these signals is shown by the accompanying illustration

The trains involved in this accident were passenger extras 2416 and 5342, they were two of 16 excursion trains running from Wash-

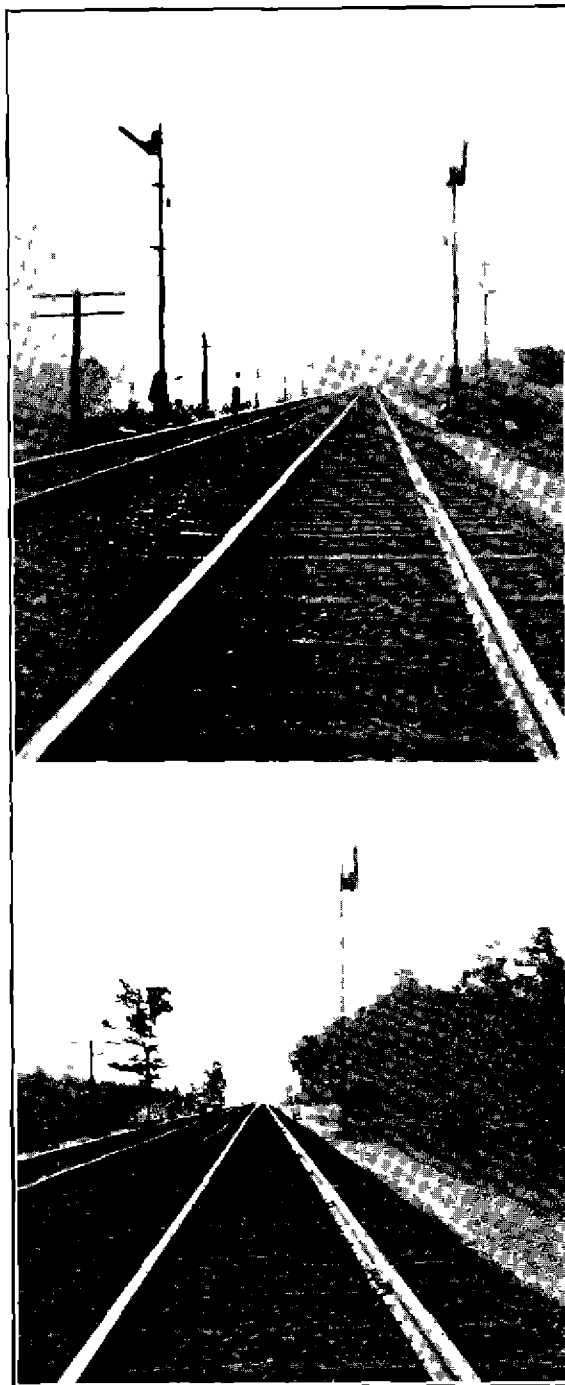


FIG 1—Signal 349 (lower) and signal 357 (upper), cut shows unobstructed view

ington and Baltimore to Atlantic City, and both of these trains left Washington on the evening of August 23. At the time of the accident extra 2416 consisted of locomotive 2416 and 12 wooden coaches in charge of Conductor Price and Pilot Engineman Robbins, extra 5342 consisted of locomotive 5342 and 12 converted tourist cars in charge of Pilot Conductor Emmons and Engineman Townsend.

Extra 2416 passed PJ tower, the reporting station at the east end of the Delaware River Bridge, at 3 19 a. m., and passed Hammonton, the last open office north of the point of accident and about 6 miles from Elwood at 3 58 a. m. Between Hammonton and Elwood this train received several caution and stop automatic block-signal indications and was also flagged by the flagman of the preceding excursion



FIG. 2—Last three cars in extra 2416 and the following train showing position in which they stopped after the accident.

sion train, extra 5130. After stopping for signal 357, extra 2416 proceeded beyond that signal and stopped a short distance behind extra 5130. The flagman went back a distance of four or five car lengths, placed torpedoes on the rail, and when recalled he lighted and left a red fusee. Extra 5130 having moved forward, extra 2416 also started and was running at an estimated speed of 6 or 8 miles an hour when extra 5342 approached, passed automatic signal 357 at danger without stopping, passed the fusee and torpedoes, and collided with the rear end of extra 2416.

Extra 5342 passed PJ tower at 3 46 a. m., passed Hammonton at 4 35 a. m. and collided with extra 2416 at about 4 43 a. m. The speed of extra 5342 at the time of collision was estimated to be 18 or 20 miles per hour.

The front wheels of the truck of engine 5342 stopped 2 325 feet south of signal 357, and subsequent investigation indicated that it

had run a distance of 71 feet beyond the point of collision before the two trains came to a stop. In train extra 2416, the rear end of the rear car, the forward end of the second car from the rear, and the rear end of the third car from the rear were damaged. The third car from the rear sustained the greatest damage, it was telescoped for a distance of 4 or 5 feet, one of the side sills was broken and the draft rigging was torn out. The underframes of the other two cars were not materially damaged. The front end of locomotive 5342, the rear end of the tender and the forward end of the first car in train extra 5342 were slightly damaged. Two car trucks were derailed but there was only very slight damage to the track.



FIG. 3.—Locomotive 5342 and rear car of train extra 2416

The position in which the trains stopped and the damaged cars are shown in the accompanying illustrations.

At Elwood there is an automatic signal which is used also as a train-order signal. This signal has a square-end blade and is a "stop-and-stay" signal. The motor-control circuit for this signal includes a knife switch in the station. When this switch is open the signal assumes or remains in the stop position and when the switch is closed the signal operates in the same manner as other automatic block signals. The office at Elwood is closed from 9:30 p. m. until 6:30 a. m., and during that period the rules require that the knife switch referred to must be closed. If a train then receives a stop signal at that point and it does not clear up, the crew is required to make certain that the office is closed, and then if unable to ascertain any reason for the stop signal the train is permitted to proceed under control as specified in the rules governing operation under automatic block signals.

On the morning of this accident an extra freight train which was being run ahead of the excursion trains received a stop indication at the signal at Elwood station. This was clearly a failure of that signal, as according to the dispatcher's records, the block ahead was not occupied. This extra freight was somewhat delayed at Elwood, but finally proceeded as authorized by the rules. The excursion trains following the freight train were also delayed at Elwood on account of this signal indicating stop due either to intermittent signal-circuit trouble or to a preceding train in the block. The investigation dis-



FIG. 4.—Second and third cars from the rear in train extra 2416

closed that for a part of the time at least, this signal was operating properly and whether or not more than the one failure, in the case of the freight train, occurred was not definitely established. In any event, the delays caused by this signal indicating stop resulted in bunching the several sections of the excursion train and at one time there were at least three and perhaps four of these extra passenger trains standing short distances apart north of Elwood.

The train-sheet record shows that extra 5342 passed West Haddonfield at 4:02 a. m. and Winslow Junction at 4:30 a. m., running the distance of 20.8 miles between those points at an average rate of speed of approximately 44 miles per hour. It passed Hammonton at 4:35 a. m., running the distance of 3.2 miles between Winslow Junction and Hammonton in 5 minutes, or at an average speed of 38 miles per hour, from Hammonton to the point of accident, a distance of ap-

proximately 6 miles, about 8 minutes were consumed which would indicate an average speed of 45 miles per hour

Dispatcher Bates stated that during his trick he handled 10 sections of the excursion train these trains being received on the lines under his jurisdiction at PJ tower, the eastern terminus of the Philadelphia Terminal Division His first record of the trains was received from that point, and the first of the extras passed PJ tower at 1 10 a m Hammonton is the last station north of Elwood where time is shown while the drawbridge at Atlantic City is the first station south of Elwood where time is shown The first extra passed Hammonton at 3 03 a m At 5 03 a m, 6 of the 10 extras were reported at the drawbridge at Atlantic City He stated that the cause for bunching the extra passenger trains at Elwood was on account of the signal at Elwood station being in the stop position, failure of this signal being reported by the first passenger extra upon its arrival at the drawbridge Freight extra 3540 was preceding the excursion trains, and that train passed Hammonton 25 minutes ahead of the first passenger extra the freight train picked up a car of ice at Amatol and this stop, together with the difference in speed between freight and passenger trains resulted in the passenger extras closing in on the freight as they approached Elwood At Winslow Junction and at Hammonton, extras 2416 and 5342 were 37 minutes apart The accident was reported to him at 5 15 a m as having occurred at about 4 43 a m

Engineman Holdcraft of the seventh section of the excursion train stated that on the night of the accident it was pretty foggy and dark, at times the fog would lift so that the range of vision was good, and at other times it became thick enough to obscure the view At Magnolia he could not see for a greater distance than about 300 feet He found signal 349 in the stop position, as was also signal 357 He stated it was about 4 20 a m when his train arrived at Elwood station, and at that time he could see his flagman at the rear end of his train, which would be a distance of approximately 800 feet

Engineman Keyser of extra 5130 stated that after leaving Philadelphia there was a slight fog, and it grew worse as he approached Elwood He thought he could see the signals at Amatol, Magnolia, and Elwood for a distance of at least 10 or 12 car lengths The signal at Amatol was in stop position when he first saw it but it went to caution before his train reached it and he did not stop but drifted on past it The next signal was red, and he stopped for a couple of minutes He then proceeded and was flagged, he pulled up behind the preceding train and stopped for five or six minutes He followed the train ahead on toward Elwood, stopping behind it again then stopping for signal 357, he stopped once more behind the

preceding train before pulling up to Elwood station where his train was standing at the time of the collision. At each of the stops behind the preceding train before reaching the station, his train stood for a period of not less than five minutes and it may have been 10 minutes. Some time after the accident when they were ready to proceed the signal at Elwood station was in the clear position.

Conductor Bennett of extra 5130 stated that when his train stopped between signal 357 and Elwood, the following train, extra 2416, closed in immediately behind his train. He was positive that it was not more than five minutes after his train passed signal 357 until extra 2416 was also in that block, and that his train was in the block between signal 357 and Elwood station at least 15 minutes prior to the time the accident occurred.

Trainmen Walton and McCue of extra 5130 stated that their train stood for quite a long time south of signal 357 before pulling up to the station. Flagman Walton stated that he flagged extra 2416 twice between signal 357 and Elwood, and that it must have been from 6 to 10 minutes from the time he first flagged it until his train moved south toward Elwood. He thought extra 2416 lay behind his train some five minutes after being flagged the first time. He saw the headlight of extra 5342 approaching before he heard the noise of the collision.

Engineman Robbins of extra 2416 stated that he took charge of the locomotive at West Philadelphia and operated it from there to the point of accident. He stated that at Hammonton and for a short distance south his train was running at about 50 miles per hour. The first signal north of Dacosta was in caution position and he immediately slowed down, passing that signal at the rate of about 20 miles per hour. The signal at Magnolia was in stop position, and when his train stopped there he could see the flagman at the rear end of his train, although the weather was foggy. He thought he could see the signal at Magnolia for a distance of about 12 car lengths, or the length of his train. He was flagged before reaching the next signal and stopped behind the preceding train. He then followed that train stopped at signal 357, and again stopped behind the preceding train after passing that signal. He estimated the time consumed at each of these several stops at from one to three minutes. After this last stop south of signal 357 when the preceding train had moved on, he called in his flagman and had gone several car lengths, running 6 or 7 miles an hour, when the collision occurred. He thought the collision occurred between 4:30 and 4:45, although he did not look at his watch. He thought his train was moving nearly the entire time after passing Hammonton until the collision occurred, and that it was standing still only a very few minutes in all at the several stops made.

Engineman Lusby who was in charge of extra 2416 between Washington and West Philadelphia was riding in the cab with Engineman Robbins from West Philadelphia to the point of accident. He stated that the weather was foggy but the signal lights were bright and could be seen for a distance of 800 to 1,000 feet. He stated that extra 2416 stopped at signal 357 at about 4:35 a. m., he first stated that train was stopped south of signal 357 some 5 or 10 minutes prior to being collided with but later he changed his statement to about 4 minutes saying that the 10 minutes previously referred to was from the stop at signal 357 until the accident occurred. He said he looked at his watch shortly after the accident occurred and it was then 4:45.

Fireman Howard of extra 2416 said his train was standing for about 5 minutes at the point where it last stopped prior to the accident.

Conductor Price of extra 2416 stated that there were 670 passengers from Washington en route to Atlantic City on his train. He noticed that the weather was a little foggy and after leaving Philadelphia he instructed Brakeman Quinn to go back to the rear end and assist the flagman. Approaching Elwood his train was stopped several times on account of stop signals and being flagged. At the last stop before the accident occurred he got off between the first and second cars, saw the flagman get off at the rear end of the train and start back, and then he went forward to the locomotive. Shortly afterward the preceding train started to move, the engineman called in the flagman and his train started. He estimated the time the train stood at that point at about two or two and a half minutes. He saw the glare of a fusee which the flagman lighted, and saw the proceed signal given from the rear end. He estimated the rate of speed at the time of the collision at from 6 to 10 miles per hour. He estimated that from the time his train slowed down for the first caution signal which was received south of Hammonton until the collision occurred a period of 10 or 12 minutes elapsed. When informed that the records indicated approximately 45 minutes had elapsed he was unable to account for the additional time.

Brakeman Quinn, of extra 2416 stated that his train made three stops between Hammonton and the point of accident, at the time of the last stop prior to the accident he was on the rear steps of the last car in the train. He said he saw Flagman Duvall go back and place one torpedo on the rail about two car lengths from the rear end of the train, then when recalled by the engineman, he placed another torpedo on the rail, lighted and dropped a fusee. He stated that he then gave the engineman a proceed signal. Looking back he saw that the fusee left by Flagman Duvall had fallen down against a tie, he ran back, picked it up, and stuck it in the end of a tie on the en-

gineman's side he then ran and caught the rear end of his train. When the following train was about 12 or 15 car lengths away he saw it coming, about that time the torpedoes exploded and the train passed the fusee. He picked up the lanterns that were on the rear platform and swung them across the track and then dropped off and started back toward the following train, giving stop signals. He said that the weather was foggy but signals could be seen for a train length, and he saw the flagman's lanterns at one stop for a distance of about 16 car lengths. He thought the train stood about two minutes, or possibly longer, at the point where the last stop was made.

Flagman Duvall of extra 2416 stated that this was his first trip in train service over the line from Philadelphia to Atlantic City and he was not familiar with the physical characteristics of the road. As the train was approaching the point where the accident occurred three stops were made at signals and behind the preceding train and at each stop he went back to flag. At the first of these stops he thought the train was standing five or six minutes and he went back a distance of 12 or 15 car lengths before he was recalled, he left a fusee at that point. He stated he could see the marker lights on the rear end of his train distinctly for that distance. The next stop was just north of signal 357, he saw that signal as he got off to flag and noticed that it was red. He said the train stopped there about a minute and a half or two minutes and he went back a distance of four or five car lengths. When the train pulled down beyond the signal and stopped behind the preceding train he stated that he started back immediately. About two car lengths from the rear end of his train he put a torpedo on the rail and had gone back about two car lengths farther when he was recalled. He then placed another torpedo on the rail lighted a fusee dropped it in the middle of the track between the two torpedoes and returned to his train. He thought the train had been standing at that point for a minute or a minute and a half. The fusee he dropped fell over and Brake-man Quinn ran back and stuck it in the end of a tie. His train had moved several car lengths before the following train came into view. He had been looking ahead and he did not see the following train until it was only six or seven car lengths away, he said he did not hear the torpedoes explode. When asked about the time consumed at the several stops and the time the accident occurred, he stated that it was 20 minutes past 4 when he last looked at his watch prior to the accident. He could not say positively where he was at that time, although he said his train must have been south of signal 357 at that time. When asked how he accounted for the lapse of 25 minutes, in view of that statement together with his statement that his train stood south of the signal for not more than two minutes,

and the fact that the accident did not occur until about 4:45 he replied that he was unable to account for it.

Engineman Townsend stated that the last caution signal indication he received was at Winslow Junction and he then had clear signals all the way to the automatic signal which displayed a red light or stop indication just north of the point where the accident occurred. He said this was the first automatic signal south of Anatol tower, and all signals were clear up to this point. He stated he had been running at the rate of about 40 miles an hour. He slowed down at Ancora, where they scooped water, and did not open the throttle in full again but merely cracked the throttle for light admission of steam. He saw the red signal when about 6 feet away from it. He immediately applied the brakes in emergency, and after running about six coach lengths he ran over torpedoes and a fusee.

After passing over the fusee and torpedoes he saw the lights on the rear end of extra 2416 ahead. He whistled for hand brakes, having already applied the air brakes, there was nothing further he could do and he jumped from his engine. He stated he was running not to exceed 40 miles an hour when passing the stop signal. He stated that prior to the accident his train was stopped at DU or Merchantville Junction and the power brakes were working all right. He said that steam was blowing around the metallic packing on the right side and thus escaping steam to some extent prevented him from seeing signals until near to them. He admitted he must have missed signal 349 at Magnolia, as he supposed that was the red signal which he overran. Relative to his rest period or time off duty, he stated he was in service Friday, August 22, for a period of eight hours, being relieved at 2:31 p. m. He was then off duty until 8 a. m. the 23d on duty from that time until 11:25 a. m., piloting a Reading train from North Philadelphia to Gloucester, 4 miles south of Camden. He was then excused and was on rest at the Young Men's Christian Association until 4 p. m. at which time he went home. He was next called for service at 12:10 a. m. August 24 to report at West Philadelphia at 3 a. m. to pilot the passenger extra he was running at the time of the collision. He had therefore been on duty for about 1 hour and 45 minutes after a period off duty of 15 hours and 35 minutes, including the time he was on rest but subject to call at the Young Men's Christian Association.

Fireman Sweeney of extra 5342 stated that he was not familiar with the physical characteristics of the West Jersey & Seashore Railroad. He observed signals from West Philadelphia until they passed the water trough near Ancora, beyond there he saw and called one clear signal but did not see any more signals before the accident occurred. He did not see any caution signal and the engineman did

not call any to him the engineman did not slow down after passing the water trough until he applied the brakes just before the collision occurred. After passing the water trough the engineman asked him to go back and see how much water there was in the tank, and shortly afterwards he asked the engineman how far it was to Atlantic City that was the last conversation they had prior to the accident. Approaching the point of accident he had just thrown coal on the fire and placed the door on the latch when the engineman applied the brakes in emergency and opened the sand valves. He stated that he did not hear any torpedoes. He stepped to the right side and looking ahead he saw the rear end of extra 2416 only about an engine length from his train. After the accident when he found the engineman lying on the northbound track, the engineman stated to him that the fog prevented him from seeing the signal until he was right at it and the flagman of the preceding train was not out far enough. He thought his train was not running more than 15 or 20 miles an hour when the brakes were applied in emergency and that they ran about two train lengths before the collision occurred.

Engineman Disney, who was relieved by Engineman Townsend at West Philadelphia, stated that the brakes were in good operating condition on extra 5342. There was a steam leak on the right side and this obscured his view to some extent when starting but not at all after the train had attained a speed of about 20 miles per hour. He was riding in the first car in the train at the time of the accident. He had not heard any torpedoes explode.

Conductor Emmons of extra 5342 stated that all the work in connection with tickets had been completed when he took charge of the train at West Philadelphia, and all he had to do was to look after the safety of his train. The train slowed down near Winslow and again at Dacosta. The weather was foggy but he thought signals could be seen for a distance of 10 or 12 car lengths. He stated that no reduction in speed was made at signals north of Elwood. He thought his train was running at the rate of about 60 miles an hour after leaving Winslow and that it slowed down to about 20 miles an hour at Dacosta, continuing at this rate of speed until the collision occurred. He stated his train came to a stop after the collision with the rear end about 29 car lengths south of signal 357. The first intimation he had that anything was wrong was when he heard the engineman answer the flag and the brakes were applied. He stated the answer to the flag, the brake application and the shock of the collision were almost simultaneous. After the accident he walked ahead to the locomotive and while there looked at his watch, it was then 4:45 and he thought two or three minutes had elapsed after the accident occurred.

Conductor Newnon, who was in charge of extra 5342 leaving Washington, stated that he was not familiar with this road. Prior to the accident he was riding in the drawing room of the rear car and when he felt the brakes go on in emergency he went to the rear platform, he was standing there when the collision occurred. When he got off after the accident there was a fusee burning about 15 feet from the rear end of the train.

Brakeman Waid of extra 5342 stated that he was riding in the rear car with the conductor at the time of the accident. He estimated the speed at from 35 to 40 miles per hour and had not noticed that the speed was reduced at any time prior to the accident.

Flagman Sentman of extra 5342 stated that when he felt the brakes being applied in emergency he went to the rear platform of his train and he felt the shock of collision when his train had passed about three car lengths beyond a burning fusee. He immediately went back to protect his train and saw that the automatic signal was red, it remained red for the entire time he watched it. The weather at that time was very foggy and he could not see the markers on the rear end of his train from the point where he went to flag but could see the signal from a distance of about 12 car lengths. He saw the electric headlight of an approaching train when it was about 15 car lengths from him but the engineman did not answer his signal given with a fusee until about 6 car lengths away. He thought the speed of his train at the time the brakes were applied was about 20 or 25 miles an hour, and at the time of the collision he thought it was 15 or 20 miles an hour.

Road Foreman of Engines Cook stated that when he arrived at the scene of the accident the sliders were open and sand was still running out. He was convinced by the tests made with locomotive 5342 that the steam leaks would not interfere with the engineman's vision after the train had attained a speed of 10 miles an hour.

Trammaster Clapp stated that he had been informed that the conductor of the extra freight train which was running ahead of the excursion trains had reported the signal at Edwood station out of order, but a search of the records in the dispatcher's office failed to disclose any message relative to that signal. He had since talked with the conductor of that freight train and he stated that the signal had been reported by him from Atlantic City. The signal was also reported by one or two sections of the excursion train.

Signal Supervisor Bell stated that signal 357 is an electropneumatic signal, and 349 is an electric-motor signal both of the three-position upper quadrant type lighted by oil lamps, the color of night indications being green for clear, yellow for caution, and red for danger. These signals had been operating properly prior to the

accident, immediately after the accident they were sealed up without any adjustment or repairs being made and had been operating properly since. He stated that the signal at Elwood station is an electric-motor signal with the motor-control circuit broken through a knife switch in the office. He had received no report of a failure of this signal on the morning of the accident, but it was reported at stop on the following morning and some dirt or foreign substance was found in one of the motor-circuit contacts in the signal mechanism. He stated that if the signal failed on the morning of the accident the trouble must have cleared itself as this signal was operating properly shortly after the accident occurred.

Signal Maintainer Bentley stated that he was called at about 5:13 on the morning of the accident, and he went immediately to signal 357, which he found in stop position. He looked at the relays, the signal mechanism and the signal light and found everything in proper condition. He then went back to signal 349, which was in caution position; there he made the same sort of examination and found everything in proper condition. After examining these signals he sealed them up without making any changes or adjustments.

In order to determine the correctness of statements made that steam escaping from leaks on locomotive 5342 obscured the view of Engineman Townsend, tests were made with this locomotive at Atlantic City on August 26. Examination disclosed that no repairs had been made on this locomotive after the accident. This locomotive is of the Pacific type, class K-4. In making the tests referred to, with steam pressure of about 200 pounds the locomotive was run over one of the yard tracks under a severe brake test. The independent brake was applied and the locomotive was operated at full and half stroke with full throttle. The locomotive was then stopped on top quarter on the right side and the main valve arranged so as to admit steam in the back portion of the steam cylinder; the throttle then being opened wide with the locomotive blocked in that position. These tests disclosed a steam leak at the right piston gland, there being a nut missing from one of the gland studs. There was also a leak around the top portion of the right back cylinder head, as well as a slight leak from the superheater damper.

These tests were unquestionably more severe, and would result in a greater emission of steam from the leaks disclosed, than would obtain under normal operation in hauling a train over the road. However, these tests demonstrated conclusively that the steam leaks on this locomotive were not sufficient to obscure proper view of signals, and they can not therefore be considered to have materially contributed to Engineman Townsend's failure properly to observe and obey the automatic block signal indications.

Engineman Townsend stated that he had slowed down at the water trough near Ancora about 12 miles north of the point of accident, and that afterwards he did not open the throttle wide, but merely cracked it open. Under these conditions only a very slight amount of steam would escape from the leaks on that locomotive. Engineman Disney, who was in charge of this locomotive between Washington and West Philadelphia, stated that steam was blowing around the metallic packing on the right side after leaving Washington, but that the leaking steam was not sufficient to obscure the vision when running at 20 miles an hour or more.

In his statement made after the accident, Engineman Townsend admits that he did not see signal 349 at Magnolia. At the next signal to the north, located at Amatol, the indication was clear, he stated that the next signal he saw which he supposed was the one at Magnolia, indicated stop, and he thought the accident occurred near Magnolia instead of south of signal 357 near Elwood. When informed of the actual location of the point of accident he said he must have entirely overlooked signal 349 at Magnolia.

Shortly after the accident occurred signal 349 was found in caution position and signal 357 was in stop position, which were the proper indications for those signals in view of conditions existing at that time. Statements of the enginemen of preceding trains show that both of these signals were operating properly before extra 5342 approached and that the signal lamps were burning and gave good indications. After the accident occurred the signals, which had been sealed, were under observation for three or four days and they operated properly without any adjustment or repair. It is therefore not questioned that the proper caution and stop indications were displayed by signals 349 and 357 for extra 5342.

The investigation disclosed that the flagman of extra 2416 at the last stop prior to the collision had gone back a distance of only about four car lengths when he was recalled, but there was considerable uncertainty and disagreement in the statements of employees questioned as to the time available for the flagman to protect his train. The trains involved in the accident passed Hamonton 37 minutes apart, and extra 2416 passed that point about 45 minutes before the collision occurred. Extra 2416 ran under clear signal indications for a part of the distance between Hamonton and the point of accident but for a distance of about 4 miles it was running at a very low rate of speed under caution and stop signals, three stops being made. The time consumed at these several stops was variously estimated, some of the employees thought that the train was standing for from 5 to 10 minutes at the point where it last stopped prior to the collision, while others estimated

that it was only from 1 to 3 minutes. The estimates of time consumed which were made by the flagman totaled some 15 or 20 minutes less than that disclosed by the train sheet record for this train at Hammonton and the time the accident occurred, when this fact was called to his attention he remarked that there seemed to be some time still to be accounted for, although he was unable to do so. The fact that when going back he placed the first torpedo on the rail only about two car lengths from the rear of his train at the last stop for which action he stated he could make no satisfactory explanation, indicates that he had no intention of going back much farther to flag. While the time that extra 2416 stood at that point could not be positively determined it is believed that had the flagman been on the alert and attentive to his duties he could have gone back a greater distance, and had he done so the accident probably would have been averted.

This accident was caused by failure of Engineman Townsend of extra 5342 to observe and obey automatic block signal indications, and by the failure of Flagman Duvall of extra 2416 to provide adequate protection for his train.

It is apparent from the investigation of this accident that Engineman Townsend failed entirely to see the caution signal at Magnolia. He was awake only a few miles north of the point of accident, as he talked with the fireman in reference to the amount of water in the tank as well as the distance to Atlantic City. While no doubt the fog varied considerably in density it is not believed that it was sufficiently heavy at any point to prevent him from seeing the signals if he was awake on the alert, and in possession of all his faculties, other employees stated that just prior to the collision lights could be seen distinctly for a distance of from 12 to 15 car lengths, and the enginemen of the preceding trains under the same weather conditions had no great difficulty in discerning signals. Engineman Townsend's statement that escaping steam from the leaks on his locomotive obscured his view and made it difficult for him to see signals is discredited by his own statement that he was using very little steam, having the throttle barely cracked open, also by the statement of the engineman who ran this locomotive from Washington to West Philadelphia, that the steam from these leaks interfered with the view ahead only when the engine was working hard and running at very low speed as well as by the tests made with this locomotive after the accident occurred, which demonstrated that there were not then sufficient leaks to cause the engineman's view to be materially interfered with when running at even a moderate rate of speed. Moreover even if it were true that fog and escaping steam prevented him from properly observing signals, he

should, and no doubt would have been running at greatly reduced speed

While Engineman Townsend stated positively that he was wide awake all the time it is believed that instead of the fog and escaping steam entirely obscuring his view of the caution signal and preventing him from seeing the stop signal until, as he said, he 'got right to it,' he must have dozed off or have suffered a momentary lapse of his mental faculties. While he had had ample time off duty prior to starting on this run he had probably had less than four hours sleep since Saturday morning and during that time he was awakened by the caller.

The collision occurred more than 2,000 feet south of signal 357, and the evidence indicates that the speed of extra 5342 had been reduced in that distance from 40 or 45 miles to 18 or 20 miles per hour. The 12 tourist cars in that train were equipped with 14-inch brake cylinders and triple valves of the P-2 type, and this brake equipment was in good operating condition. In view of these circumstances Engineman Townsend's statement that he applied the brakes in emergency opposite the signal does not appear credible, had he done so, the train would undoubtedly have been stopped or its speed would have been sufficiently reduced to prevent the collision with the preceding train which was moving at the rate of at least 6 or 8 miles an hour. It seems far more probable that instead of applying the brakes at the signal Engineman Townsend passed that signal without heeding it, being afterwards aroused and warned of impending danger by the explosion of the first torpedo, and that he then applied the brakes at approximately the location of the fusee, or about 900 feet from the point of accident.

Engineman Townsend is 30 years of age, he entered the service of the West Jersey & Seashore Railroad as a fireman in 1912, and was promoted to engineman May 17 1918. His record was good.

Flagman Duvall had been employed as a brakeman and flagman since 1912 and his record was good.

This accident again directs attention to the necessity for the use of an automatic train-control system which will operate to control a train whenever for any cause an engineman fails to see or heed danger signal indications. The necessity for a device of this character has been repeatedly pointed out in previous accident reports, recent reports of this nature being those upon the accidents at Fort Washington, Pa., on the Philadelphia & Reading Railroad, and at South Byron, N. Y., on the New York Central Railroad. In view of the accident record of the last several years which includes many accidents of this character on roads where the best trained and most competent men are employed, and modern signal apparatus is in

use, it is believed that failures of the human element in connection with train operation such as led to this accident can not be fully checked and provided against except by the use of an automatic train-control system to supplement existing automatic-block signals for the purpose of compelling obedience to signal indications

While the cars in the trains involved in this accident were of wood construction, examination of the damaged cars indicated that prior to the accident they had been in good, serviceable condition. The underframe timbers were sound and substantial. It is believed that the use of wooden cars in these trains did not contribute to any material extent to the number of fatalities and injuries.

The railroad company's records show that Engineman Townsend had to run a train from Atlantic City to Camden over this line on August 16, and that he ran an excursion train from Camden to Atlantic City on July 27. He was fireman on a train running from Camden to Atlantic City for 11 days from July 18 to 28 inclusive.

At the time of the accident Engineman Townsend had been on duty 1 hour and 45 minutes, after a period off duty of 11 hours. Flagman Duvall had been on duty 8 hours and 45 minutes after a period off duty of 17 hours. None of the employees involved was on duty in violation of the hours of service law.

Respectfully submitted

W P BORLAND,
Chief, Bureau of Safety

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